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ABSTRACTS OF THE PROCEEDINGS

OF THE

GEOLOGICAL SOCIETY OF LONDON.

No. 274.] [Session 1873–74.

December 3rd, 1873.—Joseph Prestwich, Esq., F.R.S., Vice-President, in the Chair.

James William Davis, Esq., of Albert House, Greetland, near Halifax; J. Hooke Taunton, Esq., M. Inst. C.E., of Brimscombe, near Stroud; C. J. Woodward, Esq., B. Sc. Lond., Lecturer on Chemistry and Physics to the Birmingham and Midland Institute, Birmingham; William Blakemore, Esq., Heathfield Villa, near Wolverhampton; Edward Bennett Jenkinson, Esq., Bawtry, Yorkshire; the Rev. Henry Griffith, Bowdon, Cheshire; William Cash, Esq., Elmsfield Terrace, Saville Park, Halifax; Jethro Justinian Harris Teall, Esq., B.A. of St. John's College, Cambridge, 18 Grosvenor Place S., Cheltenham; Benedict Kitto, Esq., Redruth; Henry Willett, Esq., Arnold House, Brighton; Robert Pinchin, Esq., C.E., Government Surveyor, Port Elizabeth, Cape of Good Hope; and John Shaw, Esq., M.A., Ph.D., Colesberg, South Africa, were elected Fellows of the Society.

The List of Books presented to the Library was read; it included the following:—The Sixth Annual Report of the United States Geological Survey of the Territories, embracing portions of Montana, Idaho, Wyoming, and Utah; being a Report of the explorations for the year 1872, by F. V. Heyden. G. Jervis's 'I Tesori sotterranei dell' Italia.' Parte prima. "Regione delle Alpi." E. Lartet and H. Christy's "Reliquiæ Aquitanicæ." Part XIII.

The following communications were read:—

1. "Notes on the Structure sometimes developed in Chalk." By H. George Fordham, Esq., F.G.S.

After referring to Mr. Mortimer's paper on the same subject (see Q. J. G. S. vol. xxix. p. 417), the author stated that in a pit near Ashwell the "Lower Chalk without flints" exhibits a bed of a concretionary nature, the concretions in which are marked nearly all over with lines. The lines are found only on the concretions and in their immediate neighbourhood. The fossils in the bed are invariably crushed, as if by pressure. The author believes that the striæ are due to an incipient crystallization arising from the formation of the concretions; and in support of this view he adduced a specimen of iron pyrites from the chalk of Beachy Head, attached to which is a small portion of very hard striated chalk, and suggested that the crystallization of the pyrites had induced a crystallization in the chalk. He considers, however, that in some places an almost identical structure may be due to slickensides, but only in very broken and faulted beds.

Discussion.

Mr. Seeley observed that the structure was familiar to all. If it were due to crystallization, whether incipient or otherwise, he wished to know to what combination with lime for a base the form of the crystals was due. He thought that a certain amount of phosphate of lime was present in the concretions, but was absent in similar specimens in the Upper Chalk, so that it appeared as if the same cause could not apply in both. The striæ were not, he thought, due to slipping or to organic growth, but might arise from some alteration in the character of the chalk.

Mr. Evans observed that the striæ appeared to be due to two causes—crystallization, whether incipient or destroyed, and slickensides. He thought that in the Ashwell specimens much was owing to the hard nodules resisting pressure better than the surrounding chalk, which, in being condensed, passed over their surfaces and produced a kind of slickensides. The same appeared to have been the case with the nodule of pyrites.

Mr. Forbes remarked that an inspection of the specimens on the table convinced him that in several instances the structure was due to slickensides, but that in others, traces of a very different structure were visible, which he imagined was due to crystallization, the carbonate of lime having most probably assumed the form of Aragonite, which, owing to its instability, had lost its crystalline lustre, and assumed a mealy or chalky appearance.

Mr. Judd thought that the contrast between the two papers communicated to the Society was striking. This was mainly due to the difference in the Chalk of Yorkshire and that of the south of England. The abundance of this structure in Yorkshire might well have caused Mr. Mortimer to connect it with some organic origin for the formation of the Chalk. Its rarity in the south might have led Mr. Fordham to assign another and a chemical cause. He thought that it prevailed most in those parts of the Chalk through which water most readily passed, and considered that in some cases the crystallization had been that of Aragonite, in others that of Calc-spar. He commented on the dimorphism of carbonate of lime, which under slightly different conditions assumed different characters; and remarked that, as was the case with many igneous rocks, the structure in the Chalk became more apparent after weathering.

Mr. Meyer remarked that the striæ were most common where nodules were present, and in beds in which the fossils were crushed. So far as he had observed, they were always vertical, and he attributed them to a re-arrangement of the particles of the Chalk under pressure.

The Author explained that two of the specimens had been taken from the sides of a fissure, and were actually slickensides. He thought that some of the nodules exhibit traces of internal structure; but it was true that the general direction of the striæ was at right angles to the lines of bedding. He was glad that his remarks had led to so interesting a discussion.

The Chairman suggested that an analysis should be made of the specimens.

2. "A short description of the Geology of the Eastern Province of the Colony of the Cape of Good Hope." By R. Pinchin, Esq., C.E. Communicated by H. W. Bristow, Esq., F.R.S., F.G.S.

In this paper, which was illustrated by maps and sections, the author gave the results of his observations on the geology of the above region. The two principal sections described were from Cape Saint Francis across the Great Winterhoek and Langeberg ranges to the lacustrine Triassic rocks near Jansenville, and from Port Elizabeth to Somerset. The lowest rock in the first section is the quartzite of the Great Winterhoek, which is immediately overlain to the northward by clay-shales and sandstones containing Devonian fossils. Beds with similar fossils occur at the Kromme river, Cape St. Francis, and near Uitenhage. A patch of horizontal secondary strata stretches west from the Gamtoos river, overlying the Enon conglomerate in the same way as the Jurassic strata of Uitenhage. They contain no fossils. The Enon conglomerate is seen on the flanks of the higher hills. The northern ranges, Langeberg, Klein Winterhoek, and Zuurbergen, are regarded by the author as formed of rocks belonging to the Carboniferous series, although closely resembling those of the Great Winterhoek in lithological character, except that among them are bands of the peculiar rock described by Bain as "Claystone porphyry," by Wyley as a "Trap conglomerate," by Tate as a "Trap-breccia," and by Atherstone as an "intrusive Trap." Rubidge regarded it as a metamorphic rock; and this view is adopted by the author, who describes it as underlying and overlying the clay-shales, which always separate it from the quartzite, and as passing imperceptibly into the clay-shales. The mottled sandstone or Ecca rock is referred by the author to the Carboniferous series. The author also noticed the occurrence of Tertiary or recent rocks containing remains of Mollusca identical with species now living in the adjacent seas, lying unconformably upon the Devonian, and conformably upon the Secondary rocks at various places near the coast.

Discussion.

Prof. Phillips was struck by the manner in which our system and nomenclature was applicable to a country so remote as the Cape. He was inclined to question the metamorphism of the nodules and concretions in the clay-shales into granite, and commented on the supposed interstratification of the metamorphic rocks among unaltered shales. The correlation of the rocks at the Cape with the

Devonian and Carboniferous rocks of Europe he thought most interesting, especially taking into account the distance between the two localities.

Prof. TENNANT made some remarks on the gratitude due to the first geological observers in South Africa, who had, by the discovery of the Diamond-fields, so materially added to the wealth of the colony. During the last month he had seen no less than £100,000 worth of diamonds brought over by three persons. At present some twenty thousand persons were employed in the fields, and the diamonds were equal to any in the world. The trap-rocks in South Africa were as various in their character as those in this country, and this variety might well lead to speculation as to their origin.

3. "On the Mud-craters and geological structure of the Mekran Coast." By Lieut. A. W. Stiffe, F.R.A.S. Communicated by Prof. Ramsay, F.R.S., V.P.G.S.

The coast of Mekran, extending from near the western frontier of India to the mouth of the Persian Gulf, was stated by the author to be a nearly rainless district, consisting of clay plains with precipitous tabular hills, the former veined here and there with crystalline gypsum, the latter composed of clay capped and sometimes interstratified with coarse, friable, fossiliferous calcareous strata, from 5 to 30 feet thick, supposed to be of Miocene age, and all horizontal or nearly so, except at the extreme east and west, where the strata are inclined at an angle of from 40° to 60°. Along the coast there are no distinct traces of volcanic action, but on the north coast of the Persian Gulf a similar formation has been much disturbed by the protrusion of recent volcanic material; near Jâshak to the west there is a hot mineral spring, and near Karâchi there are springs of pure hot water. The author described the mode in which denudation is effected in this region by occasional heavy rains, and by the constant action of the sea upon the coast, and then noticed the occurrence, within a few miles of the shore, of numerous peculiar mud-craters, forming hills varying in height from 20 to 300 or 400 feet above the plain, of a regular conical form, with truncated tops, and the sides sloping at an angle of about 40°. The summits of these hills present a circular cup with a narrow border, filled with semifluid mud, which occasionally flows slowly over the margin of the crater. The author considered that the conical hills have been formed solely by these overflows. He believed that a small shoal occurring off the coast near Jâshak might be produced by one of these craters, and was inclined to ascribe their existence to hydrostatic pressure rather than to volcanic action, especially as by the concurrent testimony of several natives the discharge from the craters is greater during spring tides. The thickness of the clay forming the plain is probably very considerable; it extends for some miles from the shore, sinking gradually to 20 or 30 fathoms, when there is a sudden and often precipitous descent to a depth of 300 or 400 fathoms. The author suggested that, since the deposition of the Miocene beds, the great submarine cliff may have been raised above the sea; that the land was then depressed to near its present level, causing the removal of the beds to the present coast line, and that a further depression followed by upheaval gave origin to the inland cliffs. Evidence of the last depression is furnished by the presence of borings of lithodomous mollusca in the cliffs considerably above the present sea-level.

Discussion.

Mr. Evans thought that the fact of the mud from some of the cones having ceased to flow, was in favour of the theory of their being due to hydrostatic action, the outflow ceasing when the pressure was insufficient to overcome the resistance, and a fresh vent being found elsewhere.

Mr. Forbes had frequently observed the mud-craters of Peru, which were undoubtedly due to volcanic action, though in many instances the outflow was cold, or nearly so. In the cases described by the author it was, however, possible that they might be due to another cause.

Prof. Phillips mentioned a spring which rose through mud in Bridlington Harbour, and from which the outflow was greatest at low water; but the spring tides in the Persian Gulf might, on the contrary, effect a rise in the mud-craters by obstructing some passage by which mud was discharged into the sea. Were this so, the upward movement in the crater would on each occasion probably occur somewhat later than the high tides.

Mr. Seeley remarked on the presence of undoubted volcanic action in the district, in the shape of hot springs, &c., and therefore questioned the propriety of bringing in hydrostatic pressure to account for the phenomena.

Mr. Miller cited the mud-volcanoes of Iceland as instances of pure volcanic action, and drew a distinction between the occurrence of mud-craters near the sea and at a distance from it.

The Author, in reply, observed that he had merely suggested the possibility of the outflow being due to hydrostatic pressure, and did not insist upon it. He stated that there was ample evidence of volcanic action at a distance of 200 or 300 miles from the district he had described.

The following specimens were exhibited:—

Specimens illustrative of their papers; exhibited by Messrs. Fordham, Pinchin, and Stiffe.

Diamond in conglomerate and Dicynodont bones from the Diamond Fields, South Africa; exhibited by Prof. Tennant.

The next Meeting of the Society will be held on Wednesday, the 17th inst., when the following communications will be read:—

1. "Observations on some features in the Physical Geology of the Outer Himalayan region of the Upper Punjâb, India." By A. B. Wynne, Esq., F.G.S.

2. "On the mode of occurrence of Diamonds in South Africa." By E. J. Dunn, Esq. Communicated by Prof. Ramsay, F.R.S., V.P.G.S.

3. "On the Traces of a Great Ice-sheet in the Southern part of the Lake-District, and in North Wales." By D. Mackintosh, Esq., F.G.S.